Express Mail Label No. EV 492322708 US
Attorney Docket No. S1022.81221US00
Mailed : April 14, 2005

Amendments to the Written Description of the Specification

Applicant presents replacement paragraphs below indicating the changes with insertions indicated by underlining and deletions indicated by strikeouts and/or double bracketing.

On page 1, after the title insert: --Background Of The Invention--;

On page 1, after "Background of the Invention" but before the first paragraph insert --Field of the Invention--;

On page 1, before the second paragraph beginning on line 4, insert --Discussion of the Related Art--;

Please amend the third and fourth paragraphs on page 1, lines 10-29, as shown below:

To check the proper operation of the microprocessor, a monitoring circuit 18 is generally integrated ~~to~~ in integrated circuit 10. Monitoring circuit 18 is capable of reading specific data provided by microprocessor 12 on execution of a program, and of possibly processing the read data. Test terminals 22 connect monitoring circuit 18 to an analysis tool 24. Analysis tool 24 may process the received signals, for example, according to commands provided by a user, and ensure a detailed analysis of the operation of microprocessor 12. In particular, analysis tool 24 may determine the program instruction sequence really executed by microprocessor 12.

The number of test terminals 22 may be on the same order of magnitude as the number of input/output terminals 16, for example, from 200 to 400 terminals. Test terminals 22 as well as the connections of monitoring circuit 18 take up a significant silicon surface area, which causes an unwanted increase in the circuit cost. For this purpose, a first version of integrated circuit 10 comprising monitoring circuit 18 and test terminals 22 is produced in small quantities to debug the program of microprocessor 12 or "user program". After this debugging, a version of integrated circuit 10 ~~rid of~~ without monitoring circuit 18 and of test terminals 22 is sold. This ~~implies the~~ requires forming ~~of~~ two versions of the integrated circuit, which requires a significant amount of work and is relatively expensive. Further, the final chip is not necessarily identical to the tested chip.

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Please amend the third paragraph on page 2, lines 9-12, as shown below:

Thus, standard IEEE-ISTO-5001 in preparation provides, in its 1999 version, accessible, for example, on website www.ieee-isto.org/Nexus5001, a specific message exchange protocol between a monitoring circuit and an analysis tool for a monitoring circuit 18 requiring but a reduced number of test terminals 22.

Please amend the second full paragraph on page 3, lines 14-21, as shown below:

Further, according to standard IEEE-ISTO-5001, monitoring circuit 18 can provide a message each time microprocessor 12 executes an instruction for reading data stored in memory 14 or an instruction for writing data into memory 14. Accordingly, when a loop of small size comprises a read or write instruction, monitoring circuit 18 must transmit, on test terminals 22, in addition to the messages representative of the loop jumps, messages representative of the read or write operations, which can increase the risks of saturation of monitoring circuit 18.

On page 3, before line 22, insert --Summary of the Invention--;

Please amend the paragraph beginning on page 3, line 27 through page 4, line 10, as shown below:

To achieve this ~~object~~ and other objects, the present invention provides a method for transmitting digital messages through output terminals of a monitoring circuit integrated to a microprocessor on execution of an instruction sequence by the microprocessor, each digital message being representative of characteristic data ~~memorized~~ stored by the monitoring circuit on detection of a specific event from among several specific events in the execution of the instruction sequence, one of said data corresponding to an identifier of said specific event, comprising the steps of comparing the characteristic ~~memorized~~ stored data of the last two detected specific events corresponding to a same identifier; if the compared data are identical, incrementing a repetition counter associated with said specific event; and if the compared data are different, transmitting a digital message representative of the data characteristic of the last detected specific event and, further, if the content of the repetition counter associated with said

specific event is different from zero, transmitting a digital message indicating a repetition of the specific event.

Please amend the fifth full paragraph on page 4, lines 23-25, as shown below:

According to an embodiment of the present invention, the characteristic ~~memorized~~ stored data comprise data representative of the address of the destination instruction of the last detected jump.

Please amend the first full paragraph on page 5, lines 4-21, as shown below:

The present invention also provides a device for transmitting digital messages between a monitoring circuit integrated to a microprocessor and an analysis tool, on execution of an instruction sequence by the microprocessor, comprising a means for detecting a specific event from among several specific events in the execution of the instruction sequence; a means for ~~memorizing~~ storing data characteristic of the detected specific event, one of said characteristic data corresponding to an identifier of the specific event; and a means for transmitting a digital message representative of the ~~memorized~~ stored characteristic data, comprising a means for comparing ~~memorized~~ stored characteristic data of the last two detected specific events corresponding to a same identifier; a means for incrementing a repetition counter associated with said specific event when the comparison means provides a signal indicating that the compared data are identical, the transmission means being capable of transmitting a message representative of the data characteristic of the last detected specific event when the comparison means provides a signal indicating that the compared data are different and, further, of transmitting a digital message indicating a repetition of the specific event when the incrementation means provides a signal indicating that the content of the repetition counter associated with said specific event is different from zero.

On page 5, before line 26, insert --Brief Description of the Drawings--;

On page 6, before line 6, insert --Detailed Description--;

Please amend the paragraph three on page 6, lines 6-25, as shown below:

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The present invention relates to the transmission of digital messages between a monitoring circuit integrated to the chip of a microprocessor and an analysis tool, for example, according to an architecture similar to that of Fig. 1. Monitoring circuit 18 is capable of transmitting to analysis tool 24 different messages when specific events occur on execution of a program by microprocessor 12. The coding of the digital message may correspond to the coding described in standard IEEE-ISTO-5001. For example, monitoring circuit 18 transmits to analysis tool 24 a message indicating the detection of a jump in the execution of the program by microprocessor 12. A jump can be imposed by a specific instruction of the program or be caused by elements of the circuit of microprocessor 12. A repetition of ~~a~~ the same instruction sequence of the program a number of times is, for example, obtained by a jump imposed by circuit elements of microprocessor 12. A jump may for example be systematically caused when microprocessor 12 receives an alert signal indicating a low charge level of the supply battery of circuit 10. Monitoring circuit 18 also transmits to the tool a message indicating the detection of a read or write operation on execution of the program by microprocessor 12. To determine the number of repetitions of a same message which should be provided by monitoring circuit 18 several times in a row, monitoring circuit 18 comprises a repetition counter initially set to 0 and associated with a specific message.

Please amend the next three paragraphs beginning on page 6, line 29 through page 7, line 30, as shown below:

The digital message transmission method ~~consists~~ comprises, when the same message should be transmitted by monitoring circuit 18 several times in a row on execution of the program by microprocessor 12, of transmitting the message only once, and of transmitting a message indicating the number of repetitions of the message.

At step 30, monitoring circuit 18 has detected a specific event on execution of the program stored in memory 14 by microprocessor 12 which normally leads to the transmission of a message by monitoring circuit 18 to analysis tool 24. Monitoring circuit 18 then ~~memorizes~~ stores specific data characteristic of the detected event. In particular, in the case where the detected event is a jump, ~~memorized~~ stored data correspond to an identifier of the detected jump type. Other ~~memorized~~ stored data correspond to the number of instructions executed by

microprocessor 12 between the detected jump and the previously-detected jump. Other ~~memorized~~ stored data may correspond to the destination address of the jump. The ~~memorization~~ storage of such data may be necessary to analysis tool 24, when the jump results from a jump instruction which controls a jump to a program instruction located at an address defined by a variable that can take different values. In the case where the detected event is a read or write operation, ~~memorized~~ stored data correspond to an identifier indicating whether it is a read or write operation. Other ~~memorized~~ stored data correspond to the value of the ~~memorized~~ stored or read data. Other ~~memorized~~ stored data may be representative of the address of an area of memory 14 where the data are stored or read. The method then carries on to step 31.

At step 31, monitoring circuit 18 compares the ~~memorized~~ stored data characteristic of the event detected at step 30 with the ~~memorized~~ stored data associated with the last detected event corresponding to the same identifier. The comparison is performed for data of same nature. As an example, when the event is a jump, the comparison is performed for example both on the number of instructions performed since the previously-detected jump, the destination address if available, etc. When the event is a read operation, the comparison is performed for example both on the value of the read data and the address of the memory area from which the data are read. If the last two events detected by the monitoring circuit having a same identifier are identical, the method carries on at step 32.

Please amend the fourth paragraph on page 8, lines 9-15, as shown below:

At step 34, monitoring circuit 18 transmits to analysis tool 24 via test terminals 22 a message representative of the event detected at step 30. In the case where the detected event is a jump, the message may ~~consist~~ comprise in the concatenation of the ~~memorized~~ stored characteristic data and comprise a header identifying the nature of the jump, the number of instructions performed since the preceding jump detection, the address of the jump destination instruction if available, etc.

On page 9, line 15, please insert:

--Such alterations, modifications, and improvements are intended to be part of this disclosure, and are intended to be within the spirit and the scope of the present invention.

Accordingly, the foregoing description is by way of example only and is not intended to be limiting. The present invention is limited only as defined in the following claims and the equivalents thereto.

What is claimed is:--